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ABSTRACT

This paper proposes a user-centered framework for intranet design that is based on an understanding of people, their typical problems, information behaviors, and situated contexts. It is argued that by adopting such an approach, intranets can be designed which facilitate organizational information access and use. The first section of the paper provides a discussion on organizational information use and describes the potential benefits of intranets in supporting information access in global network environments. This sets the stage for the second section of the paper which argues the need for a user-driven framework for intranet design as a means of tempering current content and technology focused systems development approaches. The remainder of the paper builds on past theoretical frameworks and empirical investigation to provide a tentative, user-centered framework for intranet design, one that can be used to facilitate organizational information access. Several design principles are offered to guide the development of intranets; these can be used to help promote information access throughout globally dispersed organizations. (Contains 39 references.) (AEF)

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Facilitating Organizational Information Access in Global Network Environments: Towards a New Framework for Intranet Design

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Abstract

As a means to promote information access across the global enterprise, many organizations today are implementing corporate intranets-private, internal networks based on internet standards which allow organizational participants to access a wide variety of information content, services, and applications throughout the enterprise. Intranets are of specific importance to widely-dispersed organizations as these systems can help bridge geographic barriers and increase communications between various organizational units, whether these are different departments within the same building, branch and home offices scattered across a nation, or domestic and foreign divisions operating in various international locales. To help facilitate the development of intranets to support information access, this paper calls for the need to investigate the contexts in which organizational participants access, search, collect, create, store, and use information as prerequisites to design. In accordance with Taylor's (1986) value-added approach to information systems, this paper suggests that intranet functionality fit the behaviors and settings of the information environment of users. Based on a review of four models of the information environment, namely Taylor's (1991) construct of the information use environment, Katzer & Fletcher's (1992) model of the information environment of managers, Rosenbaum's (1996) structurationally informed value-added model, and Davenport's (1997) information ecology model for organizations, several recurring themes are identified. These are combined with Taylor's value-added model to formulate a nested framework for intranet design. The framework offers several design principles to guide the development of intranets; these can be used to help promote information access throughout globally dispersed organizations.

INTRODUCTION

The purpose of this paper is to propose a user-centered framework for intranet design that is based on an understanding of people, their typical problems, information behaviors, and situated contexts. It is argued that by adopting such an approach, intranets can be designed which facilitate organizational information access and use.

The first section of this paper provides a discussion on organizational information use and describes the potential benefits of intranets in supporting information access in global network environments. This sets the stage for the second section of the paper which argues the need for a user-driven framework for intranet design as a means of tempering current content and technology focused systems development approaches. The remainder of the paper builds on past theoretical frameworks and empirical investigation to provide a tentative, user-centered framework for intranet design, one that can be used to facilitate organizational information access.

FACILITATING INFORMATION ACCESS WITH INTRANETS

To facilitate organizational information access, it is important to understand the various and complex ways in which organizations use information. Both Huber & Daft (1987) and Choo (1996; 1998) offer holistic views of organizational information use.

Huber & Daft (1987), in their description of information logistics, recognize that organizations use information to reduce uncertainty through formal activities of acquiring and internally distributing information about the environment. According to the authors, organizations "purposefully acquire and internally distribute information in order to carry out the critical functions of decision-making and control" (pg. 145). Conversely, Huber & Daft also acknowledge the role symbolic interactionism and communications media richness play in reducing information equivocality. Taking a symbolic

interactionist point of view, information ambiguity is reduced as organizational members create meaning through social interaction and discussion. In terms of communications media richness, Huber & Daft note a continuum of media richness where richness is defined as a medium's capacity to change understanding. The authors suggest richer information mediums be used when information ambiguity is high. (Huber & Daft, 1987, pp. 149-154)

Choo (1998), in his recent book The Knowing Organization, describes the tight interconnection between three information use processes found in current organizational behavior research-sense making, knowledge creating, and decision making. He illustrates how organizational actors continuously attempt to understand what is happening around them by collectively interpreting news and messages about the external environment through the exchange and negotiation of ideas. This sets the stage for knowledge creation where common interpretations are converted into knowledge as members share personal insights through dialogue and discourse. When there is sufficient understanding, organizational actors process this knowledge to help make decisions. This in turn invokes organizational action which causes change to the external environment, starting the cycle over again. Choo's model is important since it underlines the continuous social reconstitution of information in organizations and illustrates how the information processes of sense making, knowledge creating, and decision making energize each other.

These insights on organizational information use provide several suggestions on how to support information access across the enterprise. From an information logistics perspective, organizations can provide employees with routinized procedures for scanning and probing the environment, and can encourage the routing and summarization of information messages to relatively few organizational units (Huber & Daft, 1987, pp. 143-147). From a communications media richness point of view, organizations can provide employees with channels that support cue variety, immediate feedback, and message personalization (Daft & Lengel, 1984; Zmud et al., 1990). In terms of symbolic interactionism and the three information processes of sense making, knowledge creating, and decision making, organizations can provide organizational actors with communication mediums that support social interaction and discussion as a means to facilitate the generation of collective interpretations and the learning of new insights through shared conversation.

Intranets potentially can support the above requirements for organizational information access: they offer employees a means of acquiring and internally distributing information about the environment; they possess the capacity to give timely feedback, convey multiple cues, and tailor messages to personal circumstances; and they support dialogue and discourse through group discussions and on-line chat sessions.

Intranets are private, internal networks based on internet standards which allow organizational participants to access a wide variety of information content, services, and applications throughout the enterprise. Described as internal, business-driven computing infrastructures, these systems offer new solutions for organizations to share and integrate information into collaborative business processes (Wolesky, 1996). As "internally focused internets", intranets create compelling environments upon which to build a communications infrastructure for finding ideas and resources and creating distributed communities of practice (InfoWorld, 1996). Organizations are beginning to recognize the functionality intranets offer in connecting employees and business partners to vital corporate information (Thyfault, 1996) and moving information within an organization's boundaries (Haynal, 1996). An intranet's potential to encourage organizational enrichment is noted by Hinrich (1997) who credits this new technology with the ability to help organizations define themselves as whole entities, groups or families where "everyone knows their roles and everyone is working on the improvement and health of the organization".

Intranets are of specific importance to widely-dispersed organizations as these systems can help bridge geographic barriers and increase communications between various organizational units, whether these are different departments within the same building, branch and home offices scattered across a nation, or domestic and foreign divisions operating in various international locales. Through the use of search engines, intranets can support the browsing and exploration of information, regardless of the user's location in the enterprise. Further, the intranet's ability to facilitate employee information access directly from the desktop can promote the acquistion and use of information throughout the global organization; it has been observed that individuals tend to use information characterized by high accessibility (Allen, 1977; O'Reilly, 1982).

THE NEED FOR A USER-DRIVEN APPROACH TO INTRANET DESIGN

To facilitate the use of intranets to support information access, there is a need for a new approach to intranet design.

Typically organizations launch intranet development initiatives as a means to reduce internal information publishing costs and enhance corporate information distribution (Cortese, 1996; INET, 1996; Rice, 1996; Thyfault, 1996). As a result, organizations tend to view intranets as systems which support the capture, retention, and retrieval of enterprise-wide information in the sense that HTML (HyperText Markup Language) pages are created and stored on a variety of web servers and retrieved through the use of search engines. This perspective encourages systems developers to emphasize the identification and organization of information content and the incorporation of technological tools and features in intranet designs that best support information retrieval.

To further the development of intranets to facilitate information access and use, this paper calls for an alternate view to intranet systems development, one that tempers the predominant focus on information content and technology concerns with an awareness of the information needs and uses of organizational participants. This paper suggests that priority in intranet design be placed on people-understanding the contexts in which they are situated, the problems they typically face, and the ways they use information to help resolve their problems.

By emphasizing the importance of people, intranets are better understood as information seeking systems rather than as systems that merely support the retrieval of information. As voiced by Marchionini (1995) in his discussion of information seeking in electronic environments,

"information seeking is preferred to information retrieval because it is more human oriented and open ended. Retrieval implies that the object must have been 'known' at some point; most often, those people who 'knew' it organized it for later 'knowing' by themselves or someone else. Seeking connotes the process of acquiring knowledge; it is more problem oriented as the solution may or may not be found." (pp. 5-6).

Viewing intranets in this way helps underline the necessity for designers to understand the problems and contexts that draws people to use intranets and the ways in which information must be packaged and presented to make it meaningful to them. Doing so can enhance intranet design and improve information access. Designers can no longer assume that employees use an intranet knowing what information they want and that they can search for it directly. Developers must realize that people more often use the intranet not to find a specific answer, but rather to help them make sense of their environment, learn new ideas, or resolve their problems. By viewing intranets as mechanisms to promote sense-making, knowledge-building, and decision-making (Choo, 1998), intranets may be better designed to deliver value-added processes which support the information needs and uses of employees.

This view of intranets as information seeking systems is a less technocratic and more human-centered one. It aligns itself closely to the human-centered models of information seeking behavior proposed by Dervin (1977), Belkin, Oddy & Brooks (1982a; 1982b), and Kuhlthau (1991) that "share perspectives on information seeking as a problem-solving activity that depend on communication acts... but has only begun to influence designers and engineers who implement electronic retrieval systems" (Marchionini, 1995, pp. 29-30). This paper encourages intranet designers to adopt such a perspective.

Recent work which adds support for the need to understand user information behavior in intranet design is by Rosenbaum (1997) who investigates the feasibility of a portable methodology for the design and development of intranets. This methodology emphasizes the need to adapt a user-centered perspective in design. Rosenbaum discusses the development of an intranet prototype for an academic institution where members of a design team administered interviews to a representative user sample. The data was organized and coded using content analysis into a set of manageable categories of information seeking and use practices, as well as the perceptions, strengths, and weaknesses of the layout of the proposed intranet. This set of categories was used as input into the creation of a prototype for the system.

Gonzalez (1997) offers another example of a user-centric approach to intranet design. In her recent book The 21st Century Intranet, she outlines three requirements an intranet must meet to become a valued organizational communication device: satisfy user needs; support operational excellence; and offer functionalities and product features which make it an attractive and desirable communiations option (pp. 198-200). To do this, she presents a four-staged roadmap to intranet design consisting of inquiry, building, value-added service, and growth (pg. 263). In the inquiry stage, Gonzalez stresses the necessity to conduct user needs and organizational culture assessments prior to intranet development. Here, developers are encouraged to identify the best organizational "customers" for an enhanced intranet, their information needs, the best options for satisfying those needs, and to partner and collaborate with employees to ensure that the intranet product is truly "value-added" (pg. 268).

TAYLOR'S (1986) VALUE-ADDED MODEL

Both Rosenbaum (1997) and Gonzalez (1997) utilize user-based approaches to intranet design. Together they highlight the need for intranet developers to understand the information needs and behaviors of people and the organizational contexts in which they are situated. Though not specifically geared to intranets, a related method which raises awareness for developers to understand the informational context of users is offered by Taylor (1986) in his value-added model for information systems development. Taylor's value-added model argues the need for an analysis of the information environment of users as major input into systems design and places emphasis on looking

"...at the user and the uses of information, and the contexts within which those users make choices about what information is useful to them at particular times. These choices are based, not only on subject matter, but on other elements of the context within which a user lives and works." (1991, pg. 218)

In this approach, an information system is defined as a series of formal, value-adding processes whose purpose is to enhance the potential usefulness of information messages. According to Taylor, an information message carries only the potential for value, as it is people, not systems, who give information its meaning and worth. By defining the value of information in this way-that is, as user-based-Taylor is able to argue the need for an analysis of user information contexts so that system designers "can make estimates as to the probable utility of certain kinds of information, the preferred modes of access, and the kinds of enhancements or signals the system can provide so that use can be facilitated in that particular context" (pg. 5, italics added).

The value-added model is composed of three basic components: 1) a formal information system comprised of specific processes which add value to information messages being processed; 2) a user or set of users who, because they sit in particular situations or contexts, have certain problems which establish the criteria for judging the utility of system outputs; and, 3) an interface or negotiation space between system and users where the system displays its value-added output to assist users in making choices (pp. 201-202).

Taylor presents several steps for the design and operation of an information system based on an analysis of the information use environment (IUE), summarized here into three major steps. The first is to perform an analysis of the IUE and translate its description into "information terms". The second uses the analysis of the IUE to create value-added processes for the information system. Once operational, the products and services of the system produce outputs, which are what users see and work with to solve problems and answer questions. The third involves judging the merit of the value-added processes by determining how well the outputs of the system help users solve their problems, which is done by matching outputs of the system with problems users face in their information use environments.

In the value-added model, the merit of an information system is determined by its success in signaling the potential value of information, in helping to address or clarify particular problems, and in providing sufficient flexibility to adapt to individual needs (pg. 203). Value-added processes serve a dual purpose of signaling the potential value of information messages and relating this potential to a specific problem in a specific environment (pg. 17). In fact, Taylor identifies six categories of value-added activities that can enhance an information system: ease of use, noise reduction, quality, adaptability, time savings, and cost savings.

Taylor's value-added model is of specific interest to this paper in that it amplifies the need to investigate the information environment of users. His model emphasizes the need to describe and understand the environments from which problems arise and which require information for resolution. This has implications for intranet design as an analysis of the information environment can help encourage the development of value-added processes within an intranet that are more responsive to a wider variety of user needs and problems. The construction of such value-added processes can increase an intranet's usability and relevance, which in turn can make it easier for users to access organizational information via the intranet.

ORGANIZATIONAL INFORMATION ENVIRONMENTS

Recently, there have been several advances made in the understanding of organizational information environments. The next section of this paper examines four major works, specifically: Taylor (1991); Katzer & Fletcher (1992); Rosenbaum (1996); and Davenport (1997). From there, common elements are identified and discussed. These are used in conjunction with Taylor's value-added approach to propose a new framework for intranet design, one which can enhance organizational information access and use.

Taylor's (1991) Information Use Environment

Taylor (1991) defines the information use environment (IUE) as "the set of those elements that (a) affect the flow and use of information messages into, within, and out of any definable entity; and (b) determine the criteria by which the value of information messages will be judged" (1986, pp. 3-4). He describes four categories of the IUE, namely: sets of people, their problems, typical settings, and problem resolutions (1991, pg. 221).

For the first category, sets of people, Taylor identifies four dividing classes: professions; entrepreneurs; special interest groups; and special socioeconomic groups. For these sets of people, Taylor recommends the identification of demographic variables which help define the information environment and information behavior; specifically, education and socioeconomic status as opposed to age, sex, and marital status. Among non-demographic terms, Taylor recommends media use, social networks, and attitudes toward education, new technology, risk taking, and innovation (1991, pp. 222-224).

For the second category, the structure and thrust of problems sets of people typically face, Taylor states that each definable IUE has its own discrete class of problems and that these change over time. More importantly, problems have certain characteristics, beyond specific subject matter, called problem dimensions, "that establish the criteria for judging the relevance of information to a problem or to a class of problems" (MacMullin & Taylor, 1984, pg. 103; Taylor, 1986, pg. 42). According to Taylor, this criteria can be used to assess the usefulness of information to a user's situation.

For the third category of the IUE, typical settings, Taylor (1991, pg. 226) highlights the importance of the physical context and describes how it affects the way people work and live, and the way they seek and use information. Taylor elaborates on four general influences of setting which influence user information behavior in organizations: 1) the structure and style of the organization in terms of its attitude toward information and the causal effect of this attitude on employee information behavior; 2) the domain of interest of the unit of concern; 3) the accessibility to information; and, 4) the history and experience of the organization.

For the fourth category, resolution of problems, Taylor (1991, pp. 228-231) describes the need to understand the way sets of people anticipate solutions to their problems. There are two components to this. First, the way sets of people typically use information to solve their problems. Here Taylor identifies eight classes of information use: enlightenment; problem understanding; instrumental; factual; confirmational; projective; motivational; and, personal or political. Second, a concern over how information should be packaged and displayed to help people discover resolutions to their problems. Such information traits are "the special attributes that can be used to define the ways that information

can be identified and presented. More importantly, these traits can be related directly to the dimensions of a problem" (MacMullin & Taylor, 1984, pg. 98). In terms of information traits, MacMullin & Taylor (pp. 99-102) identify nine continuums: quantitative; data; temporal; solution; focus; specificity of use; substantive; aggregation; and, casual/diagnostic. The authors define these traits as "characteristic of stored information as are subject descriptions" (pg. 101).

Katzer & Fletcher's (1992) Information Environment of Managers

A model of the information environment of managers based on Taylor's concept of the IUE is found in a recent ARIST chapter by Katzer & Fletcher (1992). Using the context and the person as two fairly fixed starting points (1992, pg. 231), the authors formulate a model based on the characteristics of Taylor's IUE, namely people (i.e. managers), their organizational settings, their typical problems, and their range of acceptable resolutions. Central to the model is the notion that managers are confronted with problematic situations, defined as:

"a personally defined subset of the endless and murky stream of events and meanings that continuously 'flow through' a person's life. By identifying selected parts of that stream, by putting a fuzzy boundary around those parts, and by labeling those parts as a single entity that requires attention and possible action, the person creates a problematic situation. A problematic situation can be thought of as an 'agenda item' that will require cognitive and perhaps behavioral action in order for it to be taken off that person's agenda and be considered resolved. Although a problematic situation is created and defined by a single individual, it is also shaped by the features of the setting" (Katzer & Fletcher, 1992, pg. 231).

According to the model, during the resolution of problematic situations, managers exhibit information behaviors, which are actions that contribute to the usefulness of information [1]. Furthermore, as managers exhibit information behaviors, problematic situations change over time. The model attempts to explain how the IUE influences information behavior, an area left ambiguous in Taylor's writings [2], through the concept of problematic situations which provides a mechanism for relating the organizational setting to managerial information behaviors. Though the model suggests "one-directional causal relationships" between the IUE and information behaviors, Katzer & Fletcher caution that this is "an oversimplification; most likely some of the links are bi-directional" (1992, pg. 231). This model provides a better understanding of the relationship between the environment and information behaviors, furthering Taylor's value-added model.

Rosenbaum's (1996) Structurationally Informed Value-Added Model

Recent work by Rosenbaum (1993; 1996) further extends Taylor's value-added model by clarifying the relationship between the IUE and information behavior. In his Ph.D. dissertation, Rosenbaum develops and verifies a new framework for describing the information needs and uses of managers in a public sector organization. He commends Taylor's (1986; 1991) development of the information use environment as an attempt to avoid the recent debate in the Library and Information Science literature over user-centered and systems-centered approaches to determining information needs and uses (Dervin & Nilan, 1986; Hewins, 1990) [3]. However, Rosenbaum states that Taylor's constructs are ambiguous.

Specifically, Rosenbaum (1996, pg. 81) rejects "the determinative and generative powers... attributed to IUEs, including the abilities to generate problems, create information needs, and produce information behaviors". As well, Rosenbaum refutes Taylor's (1991, pg. 221) definition of information behavior as being a product of the four elements of the IUE (i.e. set of users, problems, settings, and problem resolutions) in that it suggests a unidirectional influence of structure over behavior, and does not recognize a possible counter-influencing effect of information behavior on the IUE. Furthermore, Rosenbaum does not agree with the inclusion of sets of people in the IUE itself (1996, pg. 81).

To advance Taylor's model, Rosenbaum looks to Giddens' theory of structuration (1984), and identifies Taylor's concept of the IUE as a structural component and information behaviors as an action-oriented one. He develops a structurationally informed value-added approach [4] to describe the information needs and use of managers.

In Rosenbaum's framework, the IUE is structural in nature and comprised of rules, resources, problems, and problem resolutions. Here, the IUE "has virtual existence until instantiated in action"

and is "routinely produced and reproduced through the social practices or information behaviors of users" (1996, pg. 112). Information behaviors are depicted as action-oriented, existing outside of the structure of the IUE. They "can be grouped together and seen as social practices which exist in the world" (pg. 112), and, "information behaviors are not generated or produced by an IUE, although they can certainly be constrained, shaped, and enabled by an IUE." (pg. 113). Further, there is a bi-directionality in the relationship between the IUE and information behaviors as each is shown to influence the other: "the presence of each makes the other possible; neither has meaning without the other" (pg. 112).

An interesting aspect of Rosenbaum's framework is its explanation for the persistence of information behavior in organizations over time. As users attempt to solve situations and engage in information behaviors they draw upon the rules, resources, problems and assumptions of problem resolutions of the IUE. Though users can choose to be influenced by the components of the IUE, they tend not to, unintentionally reinforcing the structure of the IUE, and explaining how information behaviors are replicated across time and space in organizations.

Rosenbaum's framework extends Taylor's value-added approach, advancing it in two significant ways: clarifying the relationship between the IUE and information behavior; and, emphasizing the bi-directional influence of these two constructs on one another. The framework "is a valuable conceptual framework that can be used in information science to conduct research on information in organizations" (Rosenbaum, 1993, pg. 243), offering "a theoretical approach that may prove to be a useful way to learn about the ways in which people in a wide variety of settings engage in information behaviors, creating and recreating their information use environments over time" (Rosenbaum, 1996, pg. 487).

Davenport's (1997) Information Ecology Model

Davenport (1994; 1997) underlines the need to understand information environments and the way people use information at work, critiquing traditional information management efforts which overemphasize the use of technology or suggest information be managed like other valuable corporate resources (Horton, 1979) [5]. He suggests a new, holistic approach, called information ecology, placing emphasis on "how people create, distribute, understand, and use information" (pg. 5).

Davenport proposes an ecological model for information management consisting of three specific environments: the information environment, the organizational environment, and the business environment. In this model, he places the information environment within the constructs of the external and organizational environments, where the external environment includes business, technology, and information markets outside an organization which have a bearing on the company's information needs and uses, and the organizational environment includes internal factors such as the corporation's overall business situation, existing technology investment, and physical arrangement (pp. 37-39). According to Davenport, the information environment is at "the core of an ecological management approach, encompassing the six most critical components of information ecology-strategy, politics, behavior/culture, staff, processes, and architecture" (pg. 34).

The first component, information strategy, refers to the high-level information intent of an organization concerning items such as information content, common information, information processes, and new information markets. Davenport states that an information strategy must be flexible, further elaborating that developing a set of basic principles, rather than fixed specific intentions, is a better vehicle for expressing an organization's information strategy (pg. 35).

The second component, information politics, "involves the power information provides and the governance responsibilities for its management and use" (pg. 35). In an earlier work, Davenport et al. (1992) caution the effect of politics on information management, describing how attempts to create information-based organizations or launch information management initiatives often end in failure due to a lack of awareness of human politics. In response, these authors identify five political models of information management: 1) technocratic utopianism, anarchy, feudalism, monarchy, and federalism. Davenport (1997, pp. 68-69) prefers federalism because of its awareness of the existence of politics and its need for rational negotiation, but he acknowledges that such an approach is not appropriate for all organizations.

The third component, information behavior and culture, combines two factors that "may matter most

in creating a successful information environment" (pg. 35). An information culture is made up of an organization's information behaviors, good or bad. Davenport identifies three specific types of information behavior critical to the improvement of a company's information environment: information sharing, "the voluntary act of making information available to others" (pg. 87), which Davenport contends is "almost an unnatural act" (pg. 90) requiring the active removal of various political, emotional, and technological barriers by management; handling information overload, where Davenport calls for engagement, a term used to describe the need to communicate information in compelling ways to encourage people to recognize and use the right information; and, dealing with multiple meanings, where Davenport suggests having multiple meanings is not always bad as it indicates an interest in an information item, but he cautions that there are times when these have to be controlled, requiring consensus and cooperation among employees close to the terms (pp. 95-97).

The fourth component, information staff, refers to the people in an organization needed to provide and interpret information to others in the company. These people do not just include technology professionals, but also content specialists, such as librarians and market researchers, and information guides who help users identify their information needs and access multiple types of information. Davenport states that the goal of such staff is to make information meaningful, recommending that they do this by providing accurate, timely, accessible, engaging, applicable and rare information. To accomplish this, Davenport encourages information staff to perform a new set of tasks which increase the value of information; namely, to prune information, add to its context, enhance its style, and choose the appropriate medium (pp. 108-127).

The fifth component, information processes, "concerns how information work gets done" and consists of "all those activities performed by information workers" (pg. 36). Such activities include the determination of information requirements, the capturing of information, its distribution, and use. Here, designers of information processes need to focus on user problems and current situations.

The sixth component, information architecture, presents "a guide to the structure and location of information within an organization" (pg. 36). Davenport states this can be either descriptive or prescriptive, stressing that the architecture be readable by all organizational participants, incorporate both computer and non-computer based information sources including pointers to people, and influence information behavior and culture (pp. 156-174).

Davenport's ecological approach to information management provides a detailed description of the components of the information environment. It brings awareness to the importance of user information behavior and offers insight into the rich and complex context in which users work.

Common Elements

The review of these four models of information environments identifies several recurring themes in the structure of the information environment and its relationship to user information behaviors.

First, all four models describe how problematic situations constitute a central component of the information environment construct. Second, all four models, especially those by Rosenbaum and Davenport, emphasize the importance of analyzing information behaviors. Third, all four models note a relationship between the information environment and information behaviors, though the description of this relationship varies from model to model. Fourth, both Taylor and Davenport discuss the need to present information in engaging ways to help people solve their problems. Fifth, to a degree, all four models discuss the influence organizational setting and culture have on information environments.

TOWARDS A NESTED FRAMEWORK FOR INTRANET DESIGN

By incorporating the common elements of the four models of the information environment with Taylor's value-added model, a framework consisting of four nested design layers is proposed as a high-level guide to intranet design. This framework stresses the need to understand the information use environments and information behaviors of organizational participants as a means of designing intranets to facilitate information access and use across the enterprise. The first layer consists of the identification and analysis of problems faced by intranet users and their typical characteristics. The second layer deals with the observation and understanding of information behaviors. The third layer

concerns itself with the development of value-added processes to be incorporated into the workings of the intranet system. The fourth layer concentrates on situating intranet design within the information ecology of the organization. Figure 1: A nested framework for intranet design offers an illustration of these four layers.

The first layer in this framework, based on the works of MacMullin & Taylor (1984), Katzer & Fletcher (1992), and Taylor (1991), calls for a central focus on problematic situations. Emphasis is placed on identifying major sets of users and the problem dimensions and problem classes they typically experience. By better understanding the typical problems organizational participants face in their information environments, intranet designers can gain insight into user information needs.

The second layer stresses the need to observe user information behavior in action. Both Rosenbaum (1996) and Davenport (1997) emphasize the importance of understanding information behavior and encouraging behaviors critical to the improvement of a company's environment such as producing, gathering, filtering, and sharing information; handling information overload; and dealing with multiple meanings. Emphasis is placed on understanding typical problem resolutions, such as the rules, resources, and information sources used by participants, and the information traits organizational participants are likely to value to help them solve their problems to their satisfaction. This allows intranet designers to gain insight on typical information seeking and information use practices.

Note the bi-directional relationship between problematic situations and information behaviors. As users exhibit information behaviors to solve their problems, the dimensions and classes of these problems are modified. Similarly, as problematic situations are altered, they affect the rules, resources, and problem resolutions drawn upon by users as they attempt to solve their problems. This relationship is supported by Katzer & Fletcher (1992) in their model of the information environment of managers which describes how problematic situations are redefined and resolved through a series of varying information behaviors elicited by managers during problem resolution. Likewise, Rosenbaum (1996) adds support through his structurationally informed value-added model which notes the bi-directional relationship between information behavior and the IUE.

The third layer in the framework, based on Taylor's (1986) value-added model, emphasizes the need to construct intranets as value-added processes. Taylor indicates the need to understand the desired information traits of users so information systems can be built to select, organize, retrieve, and display information better. Further, he suggests that the processes of an information system can add value and help users solve their problems if the outputs of the system are packaged according to desired information traits. These value-added processes should be adaptable to individual user needs, and should help users clarify problems and make choices; this may encourage the design of intranets which support users in their knowledge work. The framework suggests that designers should understand the workings of the first and second layers to help identify the necessary value-added processes for the intranet system. It is through the understanding of problematic situations and information behaviors of users that designers can be better prepared to identify and incorporate the necessary information systems and services in the intranet system to help users solve their problems.

The fourth layer of the framework identifies the need to situate design in the organizational information ecology. Davenport's information ecology model emphasizes the need to design systems that match an organization's information strategy, politics, culture, staff, processes and architecture. By doing so, intranet designers may be better prepared to develop intranets that match the information culture and strategy of the organization. In this way, intranets stand a better chance of overcoming organizational barriers that inhibit adoption and use.

This framework is supported by Allen (1996). In his book Information Tasks, Allen outlines a user-centered approach to information systems development that describes the need to adopt a problem-solving perspective to the construction of systems [6]. Allen agrees with the need to temper data-driven approaches to systems design and lays out a methodology which also emphasizes the investigation of information needs through the identification of user problems, the discovery of information tasks (i.e. behaviors) that users accomplish as they attempt to meet these needs, and the creation of value-added processes in the systems design that promote usability.

This paper suggests a new framework for intranet design that may better support the information use environment and behaviors of organizational participants. It does this by recommending designers adopt a more user-centered approach to intranet development as a means of balancing current

emphasis on content and technology concerns. Specifically, it suggests that designers describe and understand the environments from which problems arise and which require information for resolution. By doing so, intranets may be produced that better fit the information needs, behaviors, and ecology of users in organizations. This in turn may lead to more usable and relevant intranet designs, ones that facilitate organizational information access and use through global network environments.

NOTES

1 Specifically, Taylor (1991, pg. 221) defines information behaviors to be "the sum of activities through which information becomes useful".

2 For a more thorough analysis of Katzer & Fletcher's (1992) model of the information environment and its bearing on Taylor's (1991) value-added model, see Rosenbaum (1996, pp. 56-64).

3 Dervin & Nilan (1986) note a paradigm shift in the information needs and uses research from a traditional, systems-centered approach to an new, alternative one which calls for a user-orientation in the design and delivery of information services. More recently, Hewins (1990) concludes that the alternative paradigm has continued to emerge.

4 The term "structurationally-informed" refers to Giddens (1984) theory of structuration and the term "value-added" refers to Taylor's (1991) value-added model.

5 For a discussion on a process-based perspective to information management where emphasis is placed on the management of information-related activities rather than on information itself, refer to Davenport (1992), McGee (1993), and Choo (1995).

6 Allen's book Information Tasks was voted the "Best Information Science Book in 1997" by ASIS.

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